

TERRASAR-X: SCIENTIFIC PERSPECTIVE OF HIGH RESOLUTION SAR DATA

J. Hoffmann, A. Roth

DLR-German Remote Sensing Data Center, 82234 Wessling, Germany – Joern.Hoffmann@dlr.de

KEY WORDS: Synthetic Aperture Radar, High Resolution, Multi-Polarisation

ABSTRACT:

TerraSAR-X is a new German radar satellite that shall be launched in mid 2006 with a lifetime of 5 years. It carries a high frequency X-band SAR sensor that can be operated in three different modes and polarizations. The Spotlight-, Stripmap- and ScanSAR-modes provide high resolution images for detailed analysis as well as wide swath data whenever a larger coverage is required. Imaging will be possible in single, dual and quad-polarization. TerraSAR-X will be an operational SAR-system for scientific and commercial applications. The TerraSAR-project is implemented in a close cooperation between the German Ministry of Education and Science (BMBF), the German Aerospace Center (DLR) and the Astrium GmbH. DLR is responsible for the implementation of the payload ground segment for receiving, processing, archiving and distribution of the X-band SAR data, the instrument calibration, the satellite operation and the scientific use of the TerraSAR-X data. Astrium develops, builds and launches the satellite under DLR contract. Furthermore Astrium is setting up a distribution system for the commercial use of the TerraSAR-X data and products on its own cost. Distribution and value adding is the task of the Infoterra GmbH. The SpotLight (SL) mode provides products with 2 m resolution in azimuth (single look) and 1,5m to 3,5 m in range depending on the incidence angle. The azimuth resolution can be reduced to 1 m by using the SpotLight High Resolution mode. The StripMap product's resolution is 3 m while the ScanSAR mode reduces the resolution to 30 m but provides larger area coverage (100 km). Single look complex data will be available for SpotLight and StripMap modes. The detected images can be ordered as ground range and geocoded products. Digital Elevation Models of SRTM and SRTM like quality will be used for terrain correction purposes during the geocoding process. TerraSAR-X can be operated in additional experimental modes. The standard range bandwidth of 150 MHz can be doubled to 300 MHz enhancing the range resolution to less than 1 m. The dual receive antenna mode enables the acquisition of full polarimetric data as well as along track interferometry. Focus of the proposed presentation will be the scientific potential of TerraSAR-X. The innovative technological features of TerraSAR-X together with the very high spatial and temporal resolution (1-11 days) will provide new possibilities to geo-scientific research. It also will help to improve existing and to develop new technologies like differential and along track interferometry.